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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/748,812

12/30/2003

Peter Michael Finnigan

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05/25/2005

GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
PATENT DOCKET RM. BLDG. K1-4A59  
NISKAYUNA, NY 12309

EXAMINER

LE, JOHN H

ART UNIT

PAPER NUMBER

2863

DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

10/748,812

Applicant(s)

FINNIGAN ET AL.

Examiner

John H. Le

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2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04/20/2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 and 11-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18 is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Response to Amendment***

1. This office action is in response to applicant's amendment received on 04/20/2005.

Claim 14 has been amended.

Claim 18 has been added.

Claim 10 has been cancelled.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-9 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corsmeier et al. (USP 5,049,033) in view of Prowse et al. (USP 6,626,635), Haddad et al. (USP 4,999,991), and West (USP 3,227,418).

Regarding claims 1, 12, and 14, Corsmeier et al. disclose a system (72) for controlling blade tip clearance in a turbine (Abstract), the system comprising: a stator including a shroud (92) having a plurality of shroud segments (80)(e.g. Fig.5, Col.5, lines 28-61); a rotor (76A) including a blade rotatable within said shroud (Col.7, lines 39-46); a controller receiving said sensor signal and said tip clearance prediction and generating at least one command signal (e.g. Col.8, lines 36-41); said actuators including at least one actuator receiving said

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command signal and adjusting a position of at least one of said shroud segments in response to said command signal (e.g. Col.8, lines 36-41, Col.7, lines 38-50).

Regarding claims 2 and 13, Corsmeier et al. disclose said at least one command signal includes a plurality of command signals; each of said plurality of actuators receiving a respective command signal to adjust a position of a respective one of said shroud segments (e.g. Col.8, lines 36-41, Col.7, lines 38-50).

Regarding claim 8, Corsmeier et al. disclose a circumferential screw coupled to a drive mechanism, said command signal being applied to said drive mechanism to control rotation of said circumferential screw (e.g. Col.4, lines 61-63).

Regarding claim 9, Corsmeier et al. disclose said actuator includes a radial screw coupled to a drive mechanism, said command signal being applied to said drive mechanism to control rotation of said radial screw.

Corsmeier et al. fail to disclose an actuator assembly positioned radially around said shroud, said actuator assembly including a plurality of actuators; a sensor for sensing a turbine parameter and generating a sensor signal representative of said turbine parameter; and a modeling module generating a tip clearance prediction in response to turbine cycle parameters.

Prowse et al. disclose a sensor for sensing a turbine parameter (temperature, pressure) and generating a sensor signal representative of said turbine parameter (e.g. Col.4, lines 14-19).

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Regarding claim 4, Prowse et al. disclose controller (76) derives an actual turbine parameter (temperature, pressure) in response to said sensor signal; said controller (76) generating said at least one command signal in response to said actual turbine parameter (e.g. Col.4, lines 32-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to inform a sensor for sensing a turbine parameter as taught by Prowse et al. in a system for controlling blade tip clearance in a turbine of Corsmeier et al. for the purpose of providing system for controlling clearance between the tips of blades of rotating machinery and a surrounding casing during start-up and steady-state operating modes of the machinery (Prowse et al., Col.2, lines 41-45).

Haddad et al. teach a modeling module generating a tip clearance prediction in response to turbine cycle parameter (e.g. Col.3, lines 56-68).

Regarding claims 5 and 15, Haddad et al. teach said generating said tip clearance prediction is preformed in real time (controller determines current synthesized radial clearance)(e.g. Col.3, lines 56-68, Col.6, lines 20-21).

Regarding claims 6 and 16, Haddad et al. teach updating (controller 42) a model used for generating said tip clearance prediction in response to environmental changes (Col.3, lines 6-43).

Regarding claims 7 and 17, Haddad et al. teach updating (controller 42) a model used for generating said tip clearance prediction in response to engine degradation (e.g. Col.3, lines 34-43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to inform a modeling module generating a tip clearance prediction in response to turbine cycle parameter as taught by Haddad et al. in a system for controlling blade tip clearance in a turbine of Corsmeier et al. in view of Prowse et al. for the purpose of providing a method for controlling blade tip to annular shroud clearance in a gas turbine engine (Haddad et al., Col.1, lines 64-66).

West teaches an actuator (39) assembly positioned radially around said shroud (14), said actuator assembly including a plurality of actuators (e.g. Figs.2-3).

Regarding claim 3, West discloses stator includes an inner casing mechanically coupled to said shroud (14), said actuator (39) assembly positioned radially around said inner casing (e.g. Fig.3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to inform an actuator assembly positioned radially around said shroud, said actuator assembly including a plurality of actuators as taught by West in a system for controlling blade tip clearance in a turbine of Corsmeier et al. in view of Prowse et al. and Haddad et al. for the purpose of providing a means for actively controlling the seal clearance between a rotating blade assembly and an adjacent stationary member or shroud (West, Col.1, lines 63-66).

***Allowable Subject Matter***

4. Claim 18 is allowed.

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The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 18, none of the prior art of record teaches or suggests the combination of a system for controlling blade tip clearance in a turbine, the system comprising: a stator including a shroud having a plurality of shroud segments; a rotor including a blade rotatable within said shroud; an actuator assembly positioned radially around said shroud, said actuator assembly including a plurality of actuators; a sensor for sensing a turbine parameter and generating a sensor signal representative of said turbine parameter; a modeling module generating a tip clearance prediction in response to turbine cycle parameters; a controller receiving said sensor signal and said tip clearance prediction and generating at least one command signal; said actuators including at least one actuator receiving said command signal and adjusting a position of at least one of said shroud segments in response to said command signal, wherein said actuator includes an inflatable bellows in fluid communication with a pump, said command signal being applied to said pump to control pressure of said inflatable bellows. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

#### ***Response to Arguments***

5. Applicant's arguments filed 04/20/2005 have been fully considered but they are not persuasive.

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-Applicant argues that the prior did not teach, "prediction of tip clearance based on the turbine parameters and control of clearance based upon sensed parameter and predicted tip clearance" as cited in claims 1 and 12.

Examiner position is that Haddad et al. teach prediction of tip clearance based on the turbine parameters and control of clearance based upon sensed parameter and predicted tip clearance (e.g. Col.3, lines 56-68) as discussed above.

### ***Conclusion***

6. Specifically Haddad et al. has been added to second ground of rejection.

### ***Contact Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John H Le whose telephone number is 571-272-2275. The examiner can normally be reached on 8:00 - 4:30.

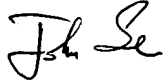
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on 571-272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

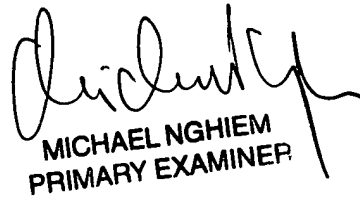


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system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John H. Le



MICHAEL NGHIEM  
PRIMARY EXAMINER

Patent Examiner-Group 2863

May 16, 2005